CLAIMS

What is claimed is:

1. A combustion system for a gas powered turbine to substantially mix and combust a fuel, to assist in substantially eliminating selected emissions, comprising:

an oxidizer flow pathway through which an oxidizer flows in a selected direction out an outlet into a combustion area;

an injector plate disposed near said outlet;

an injector port defined by said injector plate;

a fuel manifold region operably associated with said injector plate;

wherein a fuel disposed in said injector manifold region is operable to be injected into said combustion area and substantially mix with the fuel before said fuel reaches an ignition temperature.

2. The combustion system of claim 1, wherein the oxidizer flowing from the oxidizer flow pathway is generally at a temperature operable to ignite the fuel once the fuel reaches the temperature of the oxidizer.

3. The combustion system of claim 1, wherein said injector plate defines at least a portion of said oxidizer flow pathway such that said injector plate assists in defining a flow of the oxidizer through the oxidizer flow pathway;

wherein the fuel is injectable relative to said outlet.

4. The combustion system of claim 1, wherein a number of said injector port is provided at a ratio of approximately 4:1 of outlets to injector ports.

5. The combustion system of claim 1, wherein said injector port includes a swirl initiator;

wherein said swirl initiator initiates a motion of the fuel tangential to the flow direction of the fuel through the injector port.

6. The combustion system of claim 5, wherein said swirl initiator is selected from a group including a groove, a fin, and combinations thereof.

7. The combustion system of claim 5, wherein said tangential motion of the fuel initiated by said swirl initiator allows for substantial mixing of the fuel with the oxidizer that flows out the outlet.

8. The combustion system of claim 1, wherein said injector port includes a slot defined by said injector plate;

wherein said oxidizer flow pathway includes a plurality of said oxidizer flow pathways;

wherein said injector slot extends near at least a sub-plurality of said plurality of oxidizer flow pathways.

9. The combustion system of claim 8, wherein the slot includes a width of about 0.001 to about 0.1 inches.

10. The combustion system of claim 8, further comprising:

an injector port pathway formed through said injector plate at an angle of greater than about 0° to about 180° relative to a face of said injector plate.

11. An injector plate, for a combustor in a gas powered turbine, for injecting a fuel into a combustion area to be combusted by a high energy oxidizer stream, the injector plate comprising:

an oxidizer pathway to allow the high energy oxidizer to flow through the injector plate to the combustion area;

a fuel injector disposed near said oxidizer pathway to inject a selected portion of the fuel into the high energy oxidizer stream, including:

an injector outlet from which the fuel is let out;

a swirl initiator to initiate a force of the fuel in a direction generally tangential to a direction of the flow of the fuel out of the outlet;

wherein said fuel substantially mixes with the high energy oxidizer fuel stream.

12. The injector plate of claim 11, wherein said swirl initiator includes a fin projecting into at least a portion of said fuel injector;

wherein the fuel engages said swirl initiator to begin a movement of the fuel in a direction generally tangential to a longitudinal axis of the fuel injector.

13. The injector plate of claim 12, wherein said fin includes a turn rate of about 0.25 turns per inch to about 100 turns per inch.

14. The injector plate of claim 11, wherein said swirl initiator includes a groove formed in said fuel injector;

wherein the fuel engages said groove to initiate a movement of the fuel at a direction generally tangential to a longitudinal axis of said fuel injector.

15. The injector plate of claim 14, wherein said groove includes about 0.25 turns per inch to about 300 turns per inch.

16. The injector plate of claim 11, wherein the swirl initiator initiates a swirl cone angle of greater than about 0° to about 180°.

17. The injector plate of claim 11, wherein the high energy oxidizer stream includes a temperature operable to ignite the fuel once the fuel reaches the temperature of the high energy oxidizer stream;

wherein said fuel injector is operable to assist in mixing the fuel with the high energy oxidizer stream such that the fuel is substantially thoroughly mixed with the high energy oxidizer stream before the fuel reaches the auto ignition temperature.

18. An injector plate for injecting a fuel into a combustion area of a combustor for a gas powered turbine to be combusted by a high energy oxidizer stream, the injector plate comprising:

a plurality of oxidizer pathways to allow the high energy oxidizer to flow through the injector plate to the combustion area;

a fuel injector disposed near said plurality of oxidizer pathways to inject a selected portion of the fuel into the high energy oxidizer stream, including:

an injector outlet from which the fuel is let out;

wherein said injector outlet spans at lest a sub-plurality of said plurality of said oxidizer pathways to inject the fuel in a generally dispersed manner;

wherein said fuel substantially mixes with the high energy oxidizer fuel stream.

19. The injector plate of claim 18, wherein said injector outlet includes a slot including a length generally greater than the width;

wherein said length spans said plurality of oxidizer pathways.

20. The injector plate of claim 18, wherein said injector outlet generally includes a width of about 0.001 inches to about 0.1 inches.

21. The injector plate of claim 18, further comprising:

an injector pathway defining a portion of said fuel injector and operably connecting said injector outlet to a fuel source; and

a face defining a downstream area of the injector plate;

wherein said injector pathway is formed in an angle relative to said face.

22. The injector plate of claim 21, wherein said angle is greater than about 0° to about 180°.

23. The injector plate of claim 21, wherein a first injector outlet is positioned on a first side of said sub-plurality of oxidizer pathways and a second injector outlet is positioned on a second side of said sub-plurality of oxidizer pathways such that a fuel stream injected into a combustion area from each of said first fuel outlet and said second fuel outlet intersect.

24. A method of mixing a fuel with an oxidizer stream to initiate combustion of the fuel at a selected time, comprising:

forming a high energy oxidizer stream;

flowing said high energy oxidizer stream in a first direction;

outletting at least selected portion of said high energy oxidizer air stream at an oxidizer outlet; and

injecting a fuel stream, including an axial direction and a motion tangential to said axial direction, near said oxidizer outlet.

25. The method of claim 24, wherein said high energy oxidizer stream is formed by combusting at least a selected fuel in said oxidizer stream.

26. The method of claim 24, wherein injecting a fuel stream includes injecting a stream of a hydrocarbon fuel, hydrogen fuel, synthesis fuel, kerosene fuel, and combinations thereof.

27. The method of claim 24, wherein including a motion tangential to said axial direction includes:

engaging a swirl initiation element disposed within an injector which forms said fuel stream.

28. The method of claim 27, wherein said swirl initiator includes disposing a fin extending into said injector.

29. The method of claim 27, wherein said swirl initiator includes disposing a groove in said injector to impart a selected motion to the fuel stream.

30. A method of mixing a fuel with an oxidizer stream to initiate combustion of the fuel at a selected time, comprising:

forming a high energy oxidizer stream;

flowing said high energy oxidizer stream in a first direction;

injecting at least a selected portion of said high energy oxidizer air stream at an oxidizer outlet; and

injecting a fuel stream from a fuel injector slot relative to a plurality of said oxidizer outlets from said fuel slot.

31. The method of claim 30, wherein said injector slots includes:

forming at least a first injector slot and a second injector slot;

wherein said first injector slot is positioned on a first side of said oxidizer outlet and said second injection slot is positioned on a second side of said oxidizer outlet such that fuel may be injected on either side of said oxidizer outlet.

32. The method of claim 31, wherein the fuel injected from said first injector slot is operable to intersect the fuel injected from said second injector slot.